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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/697,099	10/31/2003	Wei-Chi Liu	4425-324	9011

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LOWE HAUPTMAN GILMAN & BERNER, LLP  
Suite 310  
1700 Diagonal Road  
Alexandria, VA 22314

EXAMINER

HA, NATHAN W

ART UNIT PAPER NUMBER

2814

DATE MAILED: 09/10/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 10/697,099	<b>Applicant(s)</b> LIU ET AL.	
	<b>Examiner</b> Nathan W. Ha	<b>Art Unit</b> 2814	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 31 October 2003.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Claim Objections***

1. Claim 6 is objected to because of the following informalities: the phrase "a chip" should be changed to "said chip".
2. In regard to claim 9, the phrase "said lump" should be changed to "a lump". However, the claim language is ambiguous and lacks of antecedent basis. The Office, therefore, suggests that the phrase "wherein said lump is a silicon chip" should be replaced with "wherein said sink further includes a lump, and said lump is a silicon chip."

It should be further noted that the element "silicon chip", in claim 9, is not a semiconductor chip as well known in the semiconductor packaging, where it is built of semiconductor devices, for example, transistors. The "silicon chip as claimed in claim 9 is described in the current specification as a transfer heat element, or a block, that is made of silicon or even metal materials. See Applicants' page 9, lines 10-25. Therefore, for the examination purposes, the Office assumes that the "silicon chip" is a heat transferring element, or an adapter.

3. Claim 8 is objected to because of the following informalities: Claim 8 recites the shape of the lump is quadrilateral circular. The Office assumes that this is a typographical error since neither the specification nor the drawings discussed this shape. Therefore, for the purpose of examination, the Office assumes that the language should be read, "the shape of the lump is quadrilateral or circular."

Appropriate corrections of the above objections are required.

***Claim Rejections - 35 USC § 102***

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. Claims 1-3, 8, 10, and 16-18 are rejected under 35 U.S.C. 102(e) as being anticipated by Wang et al., US 5,977,626, hereinafter, Wang.

In regard to claims 1 and 16, in fig. 4, Wang discloses a thermal dissipating element 32, or heat spreader, of a chip 22, comprising:

a top plate including a heat sink 32; and

a side plate, part of the heat sink, the top plate curving and extendedly connecting to the side plate. See also col. 3, lines 55-59.

The heat sink further is fastened to the substrate 20 through the above sole plate (applicants' claim 16).

In regard to claim 2, wherein the sink contacts the chip. See fig. 4.

In regard to claim 3, wherein the shape of the sink is circular. See fig. 5.

In regard to claim 8, and accordance with the claim objection above, wherein the shape of the lump is circular. See figs. 3 and 5.

In regard to claim 10, Wang further discloses a sole plate, which is the leg of the heat sink connected to the side plate. See fig.3.

In regard to claim 17, wherein the heat sink is fastened to the chip, and the chip is fastened between the sink and the substrate 20. See also, fig. 4.

In regard to claim 18, the sink contacts with the chip.

6. Claims 1 and 9 are rejected under 35 U.S.C. 102(e) as being anticipated by McLellan et al. (US 6,737,755, hereinafter, McLellan.

In regard to claim 1, in fig. 4F, McLellan discloses a thermal dissipating element 134, or heat spreader, of a chip 124, comprising:

a top plate including a heat sink 134; and

a side plate, part of the heat sink, the top plate curving and extendedly connecting to the side plate. See also col. 4, lines 22-24.

In regard to claim 9, McLellan further discloses that the package includes a lump 132 wherein the lump is a silicon adapter 132. See also fig. 4B and col. 3, lines 47-48.

### ***Claim Rejections - 35 USC § 103***

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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8. Claims 4-7, 13-15 and 19-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wang as applied to claims 1-3, 8, 10, and 16-18 above, and further in view of Combs et al. (US 2004/0046241, hereinafter, Combs.)

In regard to claims 5-6, 13-15, 19 and 20, Wang discloses all of the claimed limitations as mentioned above except a lump contacting between the heat sink and the chip by adhesive.

Combs, in fig.2, discloses an analogous semiconductor device package includes a substrate 100, a semiconductor chip 130, a heat sink 110, and further a lump (adaptor) 120 made of metal such as aluminum, copper, etc. (section [0026] lines 3-6) that disposed in between the chip and the heat sink and fastened by adhesive material 121 having high thermal conductivity, section [0028]. This adaptor or lump is mounted to the top of the chip for providing a thermal path away from the die for heat transferring. See also [0026].

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to embed an adaptor or lump in between the heat sink and the semiconductor chip as taught by Combs in Wang's invention in order to dissipate the heat that generated by the chip since this prevents the device from overheat. This heat dissipation with a heat sink, however, is commonly used in the semiconductor package.

In regard to claims 4 and 7, the shapes the lump and the sink are quadrilateral. See McLellan's fig. 4F and 6A.

9. Claims 11 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wang as applied to claims 1-3, 5, 8, 10, and 16-18 above, and further in view of Tang et al. (US 6,246,115, hereinafter, Tang.)

In regard to claims 11 and 12, Wang discloses all of the claimed limitations as mentioned above except the plate including a plurality of holes that being formed between the side plate and the sole plate.

Tang, in fig.2, discloses an analogous semiconductor package including substrate 30, semiconductor chip 31a, a heat sink with side plate 321 and sole plate, above 303. Tang further teaches the holes 321a are formed in between the side plate and the sole plate, which can help enforcing the bonding between the heat sink 32 and compound 33 because they are interlocked with each other. See also col.5, lines 5-8.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to drill holes in the side of the heat sink as taught by Combs in Wang's invention in order to help enforcing the bonding between the heat sink 32 and compound 33 because they are interlocked with each other.

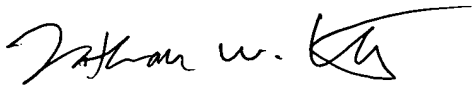
### ***Conclusion***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nathan W. Ha whose telephone number is (571) 272-1707. The examiner can normally be reached on M-TH 8:00-7:00(EST).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on (571) 272-1705. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

A handwritten signature in black ink, appearing to read "Nathan Ha", followed by a stylized flourish or mark.

Nathan Ha  
August 24, 2004